THE FOSSIL HUMAN SKULL FROM SINGA

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The Singa skull (B.M. Geol. Dept. M. 15546) was originally described by Sir Arthur Smith Woodward (1938). It has since been recognized that the horizon to which the skull can be assigned carries stone artifacts and an extensive mammalian fauna including several extinct species. This evidence, presented in the accompanying reports by Mr. Lacaille and Miss Bate, confirms the genuine antiquity of this find.

Smith Woodward concluded that the Singa specimen "differs from all human skulls hitherto described as found fossil in North Africa", and much more closely resembled Bushman skulls from South Africa. He asserted that "it may indeed be regarded as an ancestral Bushman", qualifying this statement with the remark that "in its more important features the Sudan fossil agrees still more closely with the fossil Boskop skull which was found in 1913 in the Transvaal". With these opinions in mind, I have gratefully welcomed the opportunity of studying this fossil in the light of the Bushman and pre-Bushman material from South Africa already known to me.

This study has satisfied me that Smith Woodward was essentially correct in his interpretation of this fossil and that this can be further substantiated by reference to other South African material not available to him. I feel, however, that certain of its peculiarities deserve more emphasis than he gave them. Moreover, since he described the skull, Mr. L. E. Parsons of the Department of Geology has been able to remove more of the adherent matrix, so that features previously obscured can now be examined.

I propose in describing this skull to compare it with that of the Recent Bushman and with the Boskop and other fossils from South Africa, so as to bring out its intimate relation to them. Possible resemblances to fossils from areas closer to the Sudan will be touched on later, in surveying the broader implications of the Singa find.

Comparative Description of the Singa Skull.

The remains comprise the almost complete braincase with the upper interorbital region and the outer wall of the left orbit. There are a few defects in the cranial walls; the outer half of the right superior orbital margin is wanting, and there is a fracture through the right temporal fossa, but the braincase does not appear to have been appreciably distorted. The nasal bones have been fractured and partly displaced, and the temporal process of the left zygoma is somewhat warped. The bone is heavily mineralized; in this respect as well as in the character of the matrix the skull resembles the other fossils from this horizon.

From the ossification of the cranial sutures the individual was mature and probably middle-aged; the size and robust structure indicate a male.

The first impression created by this skull was one of a singular lack of harmony between the frontal and supraorbital regions and the posterior part of the braincase. So marked was this that had the two portions been found separated, one might have hesitated to unite them. When the skull is considered in relation to South African finds, however, this seeming incongruity disappears. Nevertheless it seems appropriate, in describing this specimen, to deal first with the characters of the posterior portion and then with those of the frontal and facial regions.

In Table I the principal dimensions of this skull are compared with those of some

TABLE I

MEASUREMENTS OF SINGA SKULL COMPARED WITH TYPICAL BUSHMAN AND "STRANDLOOPER" SKULLS

	Singa	Oxford AF. 63	Oxford AF. 63	Oxford AF. 63	Oxford AF. 63	Oxford AF. 63	Oxford AF. 63	B.M. 1898	Oxford AF. 64	B.M. 1911	Range and Mean fo "typical" Bushm skulls (Keen, 194	
		418	419	420	421	1067	1070	4.29.1	1	11.14.7	Range	Me
Maximum length	189 mm.	178 mm.	172 mm.	172 mm.	171 mm.	171 mm.	165 mm.	179 mm.	177 mm.	186 mm.	165–181 mm.	174·7
Maximum breadth	155 ,,	134 ,,	134 ,,	135 ,,	135 ,,	132 ,,	135 ,,	136 ,,	142 ,,	141 ,,	123–145 ,,	132·6
Basi-bregmatic height	129 ,,	127 ,,	121 ,,	118 ,,	130 ,,	117 ,,	123 ,,	122 ,,	128 ,,	132 ,,	114–126 ,,	121·8
Minimum frontal breadth	105 ,,	94 ,,	93 ,,	89 ,,	90 ,,	88 ,,	98 ,,	96 ,,	86 ,,	89 ,,	86– 98 ,,	91·9
Supraorbital breadth	122 ,, ?	102 ,,	102 ,,	102 ,,	100 ,,	97 ,,	108 ,,	104 ,,	97 ,,	105 ,,	—	—
Interorbital breadth	28 ,, ?	22 ,,	23 ,,	24 ,,	23 ,,	20 ,,	28 ,,	29 ,,	19 ,,	22 ,,	—	—
Orbital breadth	45 ,,	36 ,,	37 ,,	36 ,,	36 ,,	33 ,,	37 ,,	36 ,,	39 ,,	35 ,,	—	—
Orbital height	35 ,, ?	28 ,,	32 ,,	30 ,,	31 ,,	29 ,,	32 ,,	29 ,,	28 ,,	27 ,,	—	—
Cranial index	82·0	75·3	77·9	78·5	78·9	77·2	81·8	76·0	80·2	75·8	69·0–83·0	75·8
Altitudinal index	68·3	71·3	70·3	68·6	76·0	68·4	74·5	68·2	72·3	71·0	66·0–73·0	69·2
Vertical index	83·2	94·8	90·3	87·4	96·3	88·6	91·1	89·7	90·1	93·6	85·0–99·0	92·0
Fronto-parietal index	67·7	70·1	69·4	65·9	66·7	66·7	72·6	70·6	60·6	63·4	62·0–76·0	69·3
Fronto-supraorbital index	86·1?	92·2	91·2	87·3	90·0	90·7	90·8	92·3	88·7	84·8	—	—

representative Bushman skulls from the British Museum and Oxford University collections. For some measurements it has been possible also to include the range and mean for a series of 31 "typical" Bushman skulls published by Keen (1947). The Singa skull is considerably larger than those of Bushmen in all dimensions except basi-bregmatic height and interorbital breadth, in which it lies at the upper limit of the Bushman range. Table II shows the measurements of this skull in comparison with those of the Boskop and other "pre-Bushman" skulls from South Africa except for the Ingwavuma skull (Cooke, Malan & Wells, 1945); these are taken from Galloway (1937). The Boskop skull is almost identical with the Singa skull in its transverse diameters, but it is very much longer; the other skulls listed are all somewhat longer and considerably narrower than the Singa specimen.

The great breadth and moderate length of the Singa skull combine to make it just brachycranial. It thus falls, as Smith Woodward has remarked, at the upper end of the Bushman range. Most of the pre-Bushman skulls are dolichocranial, only the Boskop and Fish Hoek specimens entering the mesaticranial class in which the Bushman average lies.

Viewed from above (fig. 1), the parietal region of the Singa skull is notably asymmetrical, the right parietal eminence being considerably more prominent than the left. Both eminences however are distinctly foetal in character, giving to the braincase an obtusely pentagonal cranial form. The greatest breadth is found at the level of these eminences, and the transverse contour of the vault between them is strikingly flattened. There is a broad interparietal depression along the posterior

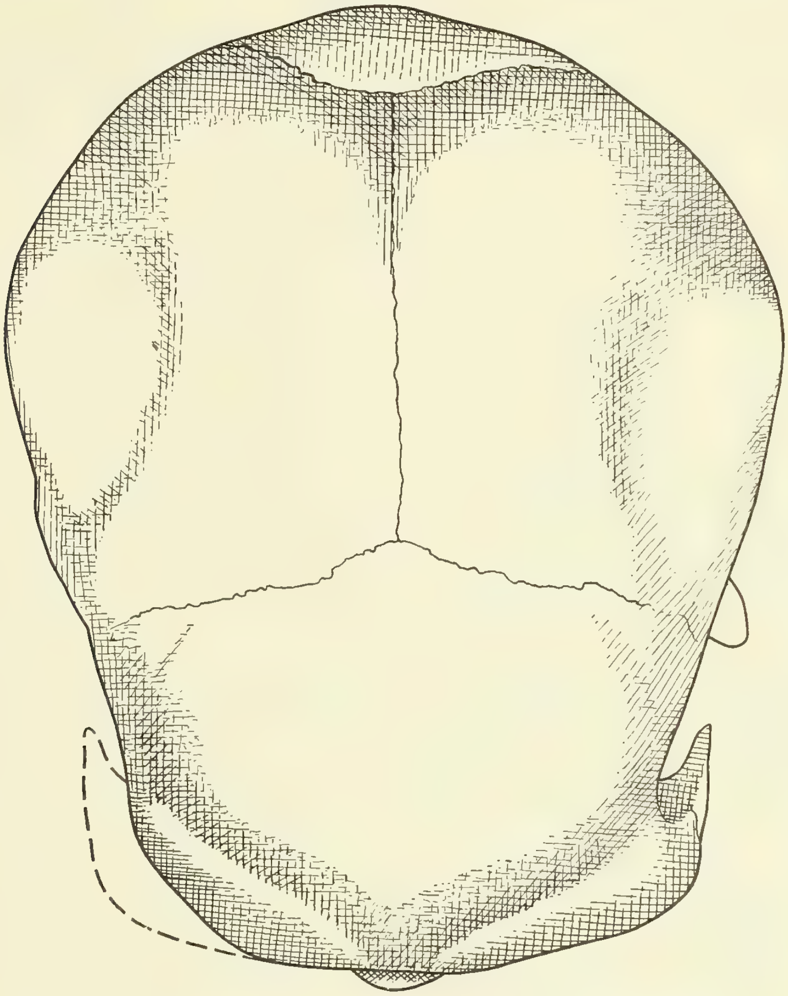

FIG. 1. Norma verticalis of Singa skull. (Natural size.)

third of the sagittal suture. In these features, as in the breadth measurement, the Singa skull is remarkably similar to the Boskop calvaria, but the same flattening is also found in the Bushman. The occiput appears shorter and more rounded in this view than that of the Boskop skull, being similar in contour to those of many Bushman skulls.

In a lateral view (fig. 2), the highest point of the cranial contour is seen to be at the bregma. From this point it descends gently to the mid-parietal region, and then in a steep curve to the short, slightly flattened occiput. The external occipital protuberance

TABLE 2

MEASUREMENTS OF SINGA SKULL COMPARED WITH SOUTH AFRICAN "PRE-BUSHMAN" SKULLS

	Singa	Boskop	Fish Hoek	Cape Flats	Spring-bok Flats	Matjes River M.R.1	Ingwa-vuma
Maximum length	189 mm.	205 mm.	200 mm.	191 mm.	195 mm.	193 mm.	195 mm.?
Maximum breadth	155 ,,	154 ,, ?	151 ,,	132 ,,	144 ,,	131 ,,	140 ,,
Porio-bregmatic height	115 ,,	115 ,, ?	114 ,,	107 ,,	120 ,,	114 ,,	115 ,,
Minimum frontal breadth	105 ,,	103 ,,	105 ,,	—	—	90 ,,	108 ,,
Supraorbital breadth	122 ,,	119 ,, ?	111 ,,	—	106 ,, ?	102 ,,	120 ,, ?
Interorbital breadth	28 ,, ?	—	28 ,,	—	—	—	—
Orbital breadth	45 ,,	—	40 ,,	44 ,,	—	—	—
Orbital height	35 ,, ?	—	30 ,,	33 ,,	—	—	—
Cranial index	82·0	75·1?	75·5	69·1	73·8	67·9	71·8?
Porio-bregmatic altitudinal index	60·8	56·1?	57·0	56·0	61·5	59·1	59·0?
Fronto-parietal index	67·7	66·9?	69·5	—	—	68·7	77·1
Fronto-supraorbital index	86·1	86·6?	94·6	—	—	88·2	90·0?

and inferior nuchal line are faintly marked, but their position is emphasized by a transverse groove crossing the posterior part of the nuchal surface. More anteriorly this surface is somewhat convex, more decidedly so on the right side than the left. The whole contour of the occipital region can readily be matched among Bushman crania; in the Boskop skull the parieto-occipital slope is less steep and the occiput more projecting.

As in Bushman skulls, the articular surfaces of the occipital condyles are very flat, but the medial margins of the condyles are elevated so that the articular surfaces are directed as much laterally as inferiorly (fig. 3). Although the margins of the foramen magnum are damaged, it was clearly short antero-posteriorly and broad transversely. It thus recalls the relatively small circular foramen observed by Gear (1926) in a cranial fragment resembling the Boskop type.

In conformity with the depressed vault of the braincase, the temporal bone is low, the highest point on the parieto-temporal suture rising little if at all above the level of pterion (fig. 2). Posteriorly this suture falls obliquely to the supra-mastoid region. The cranial wall above and below this suture is slightly convex. This convex merges above into the parietal eminence; below and anteriorly it ends in a swelling along the temporo-sphenoidal suture, referred to in descriptions of the Bushman skull as the *mons temporo-sphenoidale*. As in the Bushman also, a shallow "Sylvian" depression separates this swelling from an oval eminence which overlies the inferior frontal convolution. In a study of the Bushman endocranial cast (Wells, 1937) this modelling of the cranial wall has been shown to be determined by the development of the underlying brain.

As fig. 2 shows, the mastoid process is narrow and short, its tip descending some 20 mm. below the Frankfort plane, which is less than the average (22·5 mm.) determined by Keen (1947) for the Bushman. The digastric impression extends over the

base of the braincase medial and posterior to this process. On the outer side of the process is a blunt oblique ridge for the sterno-mastoid muscle; a narrow shallow groove separates this ridge from the thick blunt supra-mastoid crest. This crest passes backwards and upwards into the hinder end of the temporal line, while anteriorly it merges above the external auditory meatus with the relatively thick rounded posterior root of the zygomatic arch. The temporal bone as a whole and the mastoid region in particular have thus a generally infantile character resembling those of the Bushman, but combine with this a robust build which makes them more comparable with the Boskop skull. However, the mandibular fossa is deeper and the articular eminence more convex than in either the Bushman or the Boskop skull. The tympanic plate of the temporal bone appears to be thick.

So far as the hinder portion of the braincase is concerned, the most important features which the Singa skull shares with the Bushman and Boskop skulls are essentially infantile or paedomorphic. They include the flattened parietal region and prominent angular parietal eminences, the depressed parieto-temporal suture, the small mastoid process, and the modelling of the temporo-sphenoidal region. As in the Boskop skull and in contrast to the Bushman, these paedomorphic features in the Singa skull are combined with large cranial dimensions and a robust build.

Viewed from above (fig. 1) the forehead appears very constricted by contrast with the broad frontal region. Nevertheless, although Smith Woodward's estimate of 110 mm. for the least frontal diameter is probably excessive, this measurement cannot have been less than 105 mm. which is still near to the upper limit of variation in modern human crania, and is slightly larger than the measurement in the Boskop skull. Table I shows the fronto-parietal index to be well within the range of variation in Bushman skulls; it is also practically identical with those of the Boskop, Fish Hoek, and Matjes River M.R.1 skulls (Table II).

To the eye, the apparent narrowness of the frontal region is greatly accentuated by its conformation. There is a distinct median frontal keel, commencing in a conical eminence just in front of the bregma and continuing to the glabella. The frontal bosses, unlike those of the Boskop skull and of most Bushman skulls, are indistinct, and merge medially into the frontal keel, while the lateral part of the bone falls away to the very depressed temporal line. This falling away, combined with the median keel, gives to the frontal bone a definitely trigonocephalic contour. Strongly marked trigonocephaly is emphasized by Sir Arthur Keith (1933) as a feature of M.R.1 and other skulls from the Matjes River Cave. A distinct median keel is also present in the Fish Hoek and Ingwavuma skulls as well as in some Bushmen but it is not apparent in the Boskop specimen.

The supraorbital margin of the Singa skull does not conform to the contour of the tabular portion, its lateral portion projecting forward as a bold shelf which ends in a broad triangular zygomatic process. The anterior projection of this shelf amounts to 10 mm. at the middle of the upper orbital margin, and 18 mm. at the base of the zygomatic process. A large part of the area known as the *trigonum supraorbitale* thus comes to face almost directly upwards. This supraorbital shelf has a narrower continuation medially above the superciliary eminence until it is interrupted in the mid-line by the frontal keel, which here emerges with the glabella and obscures its forward projection.

In a profile view (fig. 2) the median contour of the frontal bone descends in an almost unbroken curve from the pre-bregmatic eminence to the glabella, although the convexity of the latter is masked from the side by the more prominent superciliary eminence. Such a contour is strikingly different from that of the Boskop skull and of most Bushman skulls, even those in which a frontal keel is present, these skulls displaying a vertical forehead and a more or less sharp transition to the vault.

At its medial end the superciliary eminence is clearly defined from the glabellar convexity (fig. 3), but laterally it merges into the thickened rounded lateral supra-orbital margin. The superior orbital margin thus forms a continuous bar, conforming to Type III of Cunningham's classification (1908), i.e. a genuine *torus supraorbitalis*.

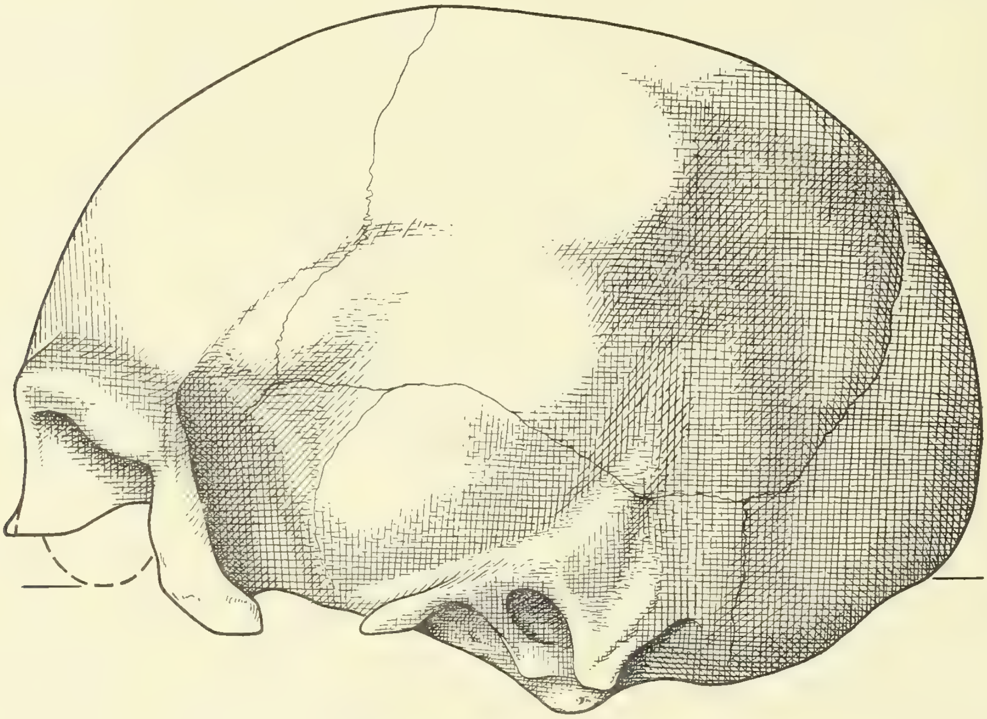

FIG. 2. Norma lateralis of Singa skull: the probable original profile of the nasal bones is indicated by an interrupted line. (Natural size.)

This torus is 12 mm. thick in its medial (superciliary) part, 10 mm. thick at the middle of the upper orbital margin, where the superciliary and supraorbital components meet, and 8 mm. thick at its lateral and most prominent part. The zygomatic process is directed laterally, only its abruptly tapered extremity being deflected downwards to articulate with the slender ascending process of the zygoma. Its anterior border forms an elongated oval tubercle, which is very conspicuous in a lateral view (fig. 3). This projection makes the ascending process of the zygoma appear to articulate behind rather than below the zygomatic process of the frontal, giving to the orbit a very strongly marked supero-lateral angle. Such an appearance is not characteristic of Bushman skulls, and can be more closely matched in some Australians. It implies that the zygoma has not been advanced to the same extent as the supraorbital margin,

so that the lateral orbital margin lies in a plane very much posterior to the inter-orbital region. Nevertheless the zygoma and zygomatic process lie well in front of the eminence overlying the inferior frontal convolution, a depression some 10 mm. broad separating the anterior limit of this eminence from the nearly vertical posterior border of the zygomatic process. This relation expresses the trigonocephalic character of the tabular frontal. The marginal tubercle on the posterior border of the ascending process of the zygoma is very slightly developed, so that this border forms almost one vertical line with that of the zygomatic process.

Smith Woodward estimated the reconstructed supraorbital width of this skull as 128 mm., a measurement exceeding those of European Neanderthal skulls and approaching those of the Broken Hill and Florisbad fossils from Central and South

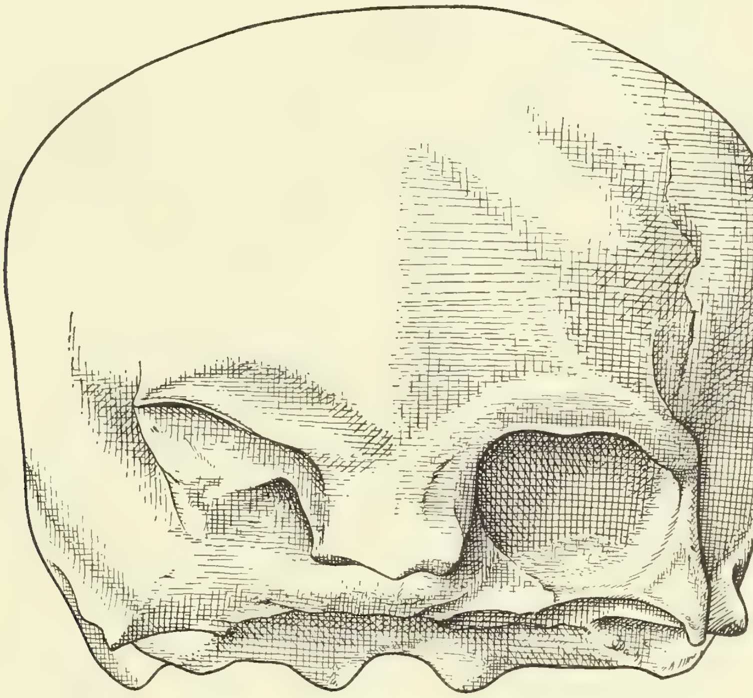

FIG. 3. Norma facialis of Singa skull. (Natural size.)

Africa. I consider that it should be reduced to about 122 mm., which is still a high figure compared with those for living types of Man (Keith, 1931, McCown & Keith, 1939). This breadth has been estimated at 119 mm. in the Boskop and 120 mm. in the Ingwavuma skull; in other "pre-Bushman" skulls it is considerably less.

In the Boskop, Fish Hoek, and Ingwavuma specimens the lateral supraorbital margin is thickened, and in the two latter it merges with the superciliary eminence to form a definite torus, but in none of them does it form a projecting shelf as in the Singa skull. Such a shelf is, however, developed to some extent in the trigono-cephalic skull M.R.1 from the Matjes River Cave, although the supraorbital region of this fossil is thinner and the forehead much narrower. The prominence of the lateral supraorbital region in M.R.1 was first pointed out by Keith (1933), and has recently been stressed by Dreyer (1947). A similar development of this region is also present

in the imperfect cranium from Canteen Kopje near Kimberley, described by Broom (1929) as "Australoid." In a recent study (Wells, 1948), I have maintained that the Canteen Kopje specimen is closely related to the Boskop skull, from which it differs chiefly in being narrower and in having smaller frontal eminences and a more projecting supraorbital region. This region in the Canteen Kopje skull thus forms a connecting link between those of Singa and Boskop.

It is not possible to measure the interorbital breadth quite exactly, and Smith Woodward's estimate of 30 mm. may be slightly too large. This figure, however, is almost equalled in some Bushman skulls. The nasion is slightly inset under the glabella, the nasal bones narrow and almost completely flat, and the nasal processes of the maxillae face more anteriorly than laterally. Thus the interorbital region, though not as extremely flat as in many Bushman skulls, is only slightly convex. The nasal bones have been fractured transversely post-mortem, and their lower portions deflected forwards, exaggerating the concavity of the nasal profile. In fig. 2 the probable original profile of this region is indicated by the broken line.

The orbital width cannot have been less than Smith Woodward's estimate of 44 mm., which is considerably more than in any Bushman skull, even among those with a very narrow interorbital region. This combination of very large orbital and interorbital breadths is clearly associated with the great supraorbital width. The orbital height was probably not as great as Smith Woodward suggested, an estimate of 35 mm. appearing more reasonable. It seems that the anterior fragment of the zygomatic arch has been warped out of its alignment with the posterior root either by a fracture of the arch during life or by post-mortem pressure, but the skull was clearly phaenozygous.

As the cranial cavity is still partially filled with matrix, its capacity cannot be directly measured, estimates made by various formulae all fall into the range 1550–1600 c.c. This may well be more than the true value on account of the angular contours of the skull, the narrow forehead and the projecting glabellar region, but the Singa skull undoubtedly belongs to the megacephalic group.

Relation of the Singa Skull to Prehistoric South African Crania

Smith Woodward, as has been stated, characterized the Singa skull as that of an "ancestral Bushman". He declared that "it differs chiefly in the greater prominence of the supraorbital ridges, and in the forward curvature of the nasal bones"; the latter feature, however, is partly an illusion due to post-mortem fracture and displacement. From this it might not seem that he laid sufficient weight upon the great size and robustness of the Singa skull which place it outside the "typical" Bushman range. Nevertheless he implicitly recognized these features in observing that "the Sudan fossil agrees still more closely with the fossil Boskop skull. . . . Its calvaria may indeed be described as a brachycephalic variant of the Boskop type."

The foregoing analysis can leave little doubt that the Singa skull, like that of Boskop, belong to the "Bushmanoid" division of mankind, whether this is regarded as a fundamental human type or merely as a variant of the Negro. On the information at Smith Woodward's disposal, his conclusions are undoubtedly warranted. But they

confront us directly with some of the most debatable questions in South African physical anthropology: the origin of the Bushman type and the relation of the Boskop and other fossil crania to this type and to each other. The bearing of the Singa skull upon these questions must be considered in the light of discoveries and interpretations not available to Smith Woodward. A summary of the opinions held by leading authorities in South Africa upon these issues has been given elsewhere (Wells, 1948*a*).

Shrubsall (1907) first recognized among prehistoric South African crania a type more robust than that of the typical Bushman. To this he applied the name "Strandlooper", a usage since generally abandoned. An example of this type is the skull B.M. 1911: 11.14.7 (Table I). It will be seen that this skull, though both longer and broader than those of most Bushmen, is considerably smaller in both these dimensions than the Singa skull. Shrubsall, followed by Broom (1923, 1941) and to some extent by Dreyer (1947), regarded this robust type as the parent of the Bushman. Broom has further suggested that the Boskop fossil represents a still earlier stage in the same sequence, inferring that this paedomorphic stock has been progressively and drastically reduced in its cranial dimensions. Dart and his school, on the contrary, have regarded the giganto-paedomorphic Boskop and pygmaeo-paedomorphic Bushman as independent though related types, and suggested that the robust "Strandlooper" type of Shrubsall might have arisen by hybridization between them.

Some of the "Strandlooper" skulls, such as Oxford AF. 64/1 (Table I), resemble the Singa skull in being relatively broad. Galloway (1936) argued that these might be regarded as hybrids combining Bushman length with Boskop breadth. This is not strictly true; unlike the Singa fossil, these broad-headed "Strandloopers" are considerably narrower than the Boskop skull. Dreyer, Meiring & Hoffman (1938) have reversed this interpretation, regarding the Boskop skull as a hybrid between the short, broad Bushman type and a long, relatively narrower "Hottentot" type. These authors make the important suggestion that in hybridization between such types any of the cranial diameters may become larger or smaller than in either parent.

The Singa skull has been found to agree with that of Boskop in being definitely paedomorphic and at the same time robust. These skulls are also practically identical in their breadth measurements, but differ markedly in length and consequently in cranial index. This difference in proportions, even without the contrast in their frontal characters, makes it seem unlikely that they fall within the range of variation of a single type. It is true that their cranial indices lie within the Bushman range, but to our present knowledge they are not linked by a series of intermediate, mesaticranial specimens. Indeed the Boskop skull appears rather to be linked to a group of equally long but narrower crania such as that of Canteen Kopje. I consider that the term "Boskop type" should be limited to this group, and not extended, as by Galloway (1937) to embrace all "pre-Bushman" skulls.

If this view is adopted, the Singa skull cannot simply be referred to the "Boskop type". Either the Singa and Boskop fossils are different stages in development (not necessarily in one line) from a common ancestral stock, or their common heritage has been modified, in one or both, by hybridization. Such a conclusion is borne out by their contrasted frontal characters, in spite of the link provided by the Canteen Kopje skull. The existence of this link suggests that we may have here a single

developmental sequence rather than two diverse types. On general principles one might suppose that such a sequence would proceed from a non-paedomorphic to a paedomorphic type, so that the Singa frontal would represent a more primitive stage than that of Boskop, but the converse is by no means impossible. It is also possible to conclude that the frontal regions of these two skulls represent diverse specializations, without necessarily assuming, as Broom (1941) does, that a prominent supraorbital region always belongs to an "Australoid" strain foreign to the Bushman-Boskop stock. Except for the Matjes River skull M.R.1, none of the "pre-Bushman" types listed in Table II approach the Singa fossil so closely as does the Boskop skull. Although the Fish Hoek and Ingwavuma skulls have comparable frontal and supraorbital diameters, their supraorbital development is dissimilar, and they are widely different in other respects. At the most, therefore, these skulls represent a divergent development from the same stock.

M.R.1 and the Singa skull are similar in length and height as well as in frontal characters, but are widely different in frontal and parietal breadth. The Singa fossil also is more robust in its supraorbital development, but in assessing this feature it must be remembered that according to Dreyer (1947) M.R.1 is female, whereas the Singa skull is almost certainly male.

Keith (1933) and Galloway (1937) associated M.R.1 with the Boskop type, a view which I can no longer accept. More recently Dreyer (1947) has strongly asserted the claim of M.R.1 to be regarded as ancestral to the Bushman type. He thus attributes to this specimen precisely the same significance that Smith Woodward ascribed to the Singa skull. Dreyer has shown that a continuous sequence can be traced from the supraorbital region of M.R.1 to that of the typical Bushman, and has suggested that M.R.1 links the Bushman with the still older Florisbad skull. He thus adopts the view that the history of the frontal region in this group has been one of increasing paedomorphic specialization. The Singa frontal region might plausibly be introduced into the sequence envisaged by Dreyer as a stage even preceding that of M.R.1. Its greater breadth would not preclude this if the extraordinarily broad Florisbad type is taken as the starting point. Alternatively it might form part of a parallel sequence leading to the Canteen Kopje and Boskop skulls.

I think it highly probable that the frontal region in the "Bushmanoid" group has evolved very much as Dreyer suggests, even if his phylogenetic inferences are not necessarily acceptable. But I suspect that the starting point of this sequence was a type less extreme in development than the Florisbad skull, and possibly not very different in frontal characters from the Singa skull.

It would be a happy conclusion if we could regard the Singa skull and M.R.1 as within the range of variation of a single proto-Bushman type, but the difference in frontal and parietal breadth appears too great for this. Nevertheless I consider the Singa fossil to be at least as nearly related to M.R.1 as to the Boskop skull. The solution which again offers itself is that in these skulls we have a common proto-Bushman stock modified either by divergent descent or by hybridization. Which of them most nearly preserves the basic features of this stock can only be determined when we have available series instead of individual skulls.

In view of the distance separating them, it would have been most remarkable had the Singa fossil proved to be exactly comparable with any individual specimen

from South Africa such as M.R.1 or the Boskop skull. The fact that it falls naturally into this constellation of "Bushmanoid" types is sufficiently significant.

Relation of the Singa Skull to North and East African Types

Smith Woodward qualified his assertion that the Singa specimen "differs from all human skulls hitherto described as found fossil in North Africa" by remarking that "it seems to resemble a little some skulls in the varied collection made by Dr. C. Arambourg from an Upper Palaeolithic deposit in the rock-shelter of Afalou-bou-Rhummel on the coast of the Gulf of Bougie in Northern Algeria". He appears to have had in mind particularly those skulls which Arambourg, Boule, Vallois & Verneau (1934) have characterized as "type à tendance brachycephale". I consider, however, that if the Singa fossil is compared with the excellent illustrations published by these authors, it must be deemed fundamentally different. This is perhaps most evident in the supraorbital and interorbital regions, but it is also true of the temporal region and hinder part of the braincase. It appears very unlikely that there is even a trace of the Singa type infused into the Afalou group. The differences which set off the Singa skull from those of Afalou also distinguish it from all European crania of Upper Palaeolithic as well as more recent age.

It might also be imagined from the broad frontal region and thick prominent supraorbital region of the Singa skull that it might be compared with the Skhul group of Neanderthaloid fossils from Palestine. Had the Singa frontal bone been found isolated, it seems possible that an attempt might have been made to force it into this group. But the detailed analysis of the Skhul frontal region made by McCown & Keith (1939) clearly differentiates the Singa specimen from it, apart from equally marked differences in the hinder part of the braincase.

South of the Sudan, a large number of fossil skulls from Kenya have been described by Leakey (1935). None of these reveals a combination of features at all approaching that of the Singa skull, especially with regard to its frontal characters. Nevertheless the skull Gamble's Cave 4 of Kenya "Aurignacian" age, although longer and narrower than the Singa fossil and totally different in its frontal and interorbital regions, resembles it in displaying well-marked parietal eminences, a similar occipital profile, and small mastoid processes. The same features may be identified in other skulls from Kenya of more recent age. Leakey has indeed characterized the Mesolithic skulls from the Homa shell-mounds as "Boskopoid", and this might equally be applied in a loose sense to other crania of Mesolithic and Neolithic age. Thus although these prehistoric types of Kenya are all basically "Caucasoid", it seems possible that there is an element in them related to the Singa type.

This suggests a further tentative speculation. The industry with which the Singa skull is associated appears to belong to the Levalloisian tradition. Now Leakey has maintained that in Kenya the Levalloisian and its derivative the Kenya Stillbay represent a sequence developing parallel to but independently of the Kenya "Aurignacian". In South Africa the Matjes River and Boskop crania as well as that of Springbok Flats are associated with industries of the same Levalloisian tradition. It seems at least possible that the same "pre-Bushman" stock was associated with

the Levalloisian and its derivatives in north East Africa, and mingled to a small extent with the contemporary Aurignacians.

The only human type which has so far been associated with the Levalloisian in East Africa is the Lake Eyasi (Njarasa) fossil skull. This has been variously ascribed to a very primitive (Pithecanthropic) type, and to a type closely resembling and perhaps identical with the Broken Hill skull (*Homo rhodesiensis*). After examining casts of the Lake Eyasi material, I consider that it is definitely not Pithecanthropic. While the possibility that it is related to Rhodesian Man is much stronger, there seems to be still a further alternative, viz. that it is to be compared with "pre-Bushman" types. It cannot be directly related to the Singa skull, for the hinder portion, which is the best preserved part of the Lake Eyasi fossil, is much narrower and has a very different transverse contour. In these respects the Lake Eyasi skull rather suggests comparison with the Fish Hoek and Cape Flats crania from South Africa, but its frontal region appears very much more primitive than that of either of these specimens. The remains of this region are, however, very fragmentary, and it seems quite possible that it should be reconstructed rather similarly to that of the Singa skull, or if not so to that of the Florisbad skull. Until the conformation of the zygomatic region is known, I find it impossible to determine whether the Lake Eyasi skull is "Rhodesioid" or "Bushmanoid" in type. It seems to me, therefore, that the Levalloisian associations of the Lake Eyasi skull are not at all incompatible with similar associations for the Singa skull.

Another African fossil which demands comparison with the Singa skull is that from Asselar in the southern Sahara, described by Boule & Vallois (1932). These authors interpret the Asselar skull as "Hottentot" in type, and also remark on its resemblances to the Boskop fossil. It remains doubtful, therefore, whether this skull is fundamentally "Bushmanoid" or whether it is related to non-Bushman elements which have penetrated into South Africa and there mingled with the Bushmanoid types. In any case the Asselar skull differs from the Singa fossil in being longer, narrower and lacking the supraorbital prominence. Even if it is fundamentally Bushmanoid, it represents a variation of this type quite separate from the Singa specimen.

Finally, the recognition of a "pre-Bushman" type in the Nile valley raises the issue of the centre of origin and direction of spread of this type. Here we have at present two opposite points of view. Most South African workers have regarded the "Bushmanoid" stock as native to Africa and especially to southern Africa, whence it overflowed into North Africa; Dart (1939) has even suggested that it penetrated into Europe. Broom (1941) in South Africa supports the contrary view, favoured by several thoughtful investigators outside Africa, that the "Bushmanoid" type entered Africa from the north and has an ultimate Asiatic origin. If it could be demonstrated that the Singa skull is older than the earliest Bushmanoid crania of South Africa, it might be interpreted as evidence for the latter view. But if we accept the frontal characters of the Singa skull as those of an early stage in the specialization of the Bushman type, it might equally be argued that it represents an early northward expansion from a southern centre of origin. Until we are more certain of the relative antiquity of such South African finds as the Boskop skull and M.R.1, as well as of the Singa fossil, any hypothesis of the mutual relationship of these types which goes beyond recognizing that they are all "pre-Bushman" must remain speculative.

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